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otherwise the scalding water will be cooled too much; then dip it in a large vessel containing water heated to not less than 132° and not exceeding 135°. Shake or stir it thoroughly, so that the water will reach every grain. Remove the basket occasionally, and add boiling water until the temperature is brought up to the proper point. Keep it in hot water fifteen minutes, then spread out to dry. If this work is thoroughly done, the smut-spores will be destroyed without any injury to the wheat.

DRIED BREWERS' GRAINS.

THE dairymen of our larger cities and towns who live in the neighborhood of large brewing establishments have long recognized refuse brewers' grains as excellent food for milch cattle.

In brewing, says Mr. William Frear, in Bulletin No. 12 of the Pennsylvania State College Agricultural Experiment Station, the barley is first started to germinating, by which most of the starch is changed to maltose, a soluble compound related to sugar. At the proper stage germination is arrested by drying the grains; and the sprouts, which would impart undesirable qualities to the "wort," are removed by stirring and screening. The maltose is then extracted from the grain by hot water to form the wort, or liquid in which alcoholic fermentation is to be set up. The grain left after the wort is drawn off is known as "brewers' grains."

It is a very watery material, expensive to carry great distances, and difficult to preserve, being highly fermentable. Since, however, it contains nearly all of the nitrogenous matter of the original grain, with a much smaller percentage of starch, it forms, in spite of its watery condition, a very important cattle-food.

It has heretofore been found difficult to dry it economically, so as to make its preservation and transportation possible. Recently the Pabst Brewing Company of Milwaukee, Wis., have dried the grain at a low temperature by means of a vacuum process, and without the removal of the last traces of wort by pressure.

An analysis shows that out of the 21.50 per cent of proteine, 17.44 per cent consists of true albuminoids. Careful tests showed no traces of sugar left in the grains, and only 3.17 per cent of starch.

In composition it lies, in most respects, between linseed-meal and wheat-bran, save that it has nearly twice as much fibre. Malt sprouts are somewhat more highly nitrogenous, and contain only about half as much fibre, but they contain only one-ninth as much fat, which, in this case, is probably very largely digestible and of high nutritive value.

If placed upon the market at such a price as to compete with other foods of its class, it will undoubtedly, according to Mr. Frear, prove a valuable addition to the list of highly nitrogenous by-products useful as cattle-foods.

NOTES AND NEWS.

THERE is some difference of opinion as to the original meaning of the word "kangaroo." At the meeting of the Linnean Society of New South Wales on Aug. 27, says *Nature*, the question was discussed, whether, in the dialect of the blacks of the Endeavour River, the word signified "I don't know," and was so used in answer to the queries of Capt. Cook's party, or whether, as Cook supposed, it really was the name of the animal in use among the aborigines of the locality.

—Mr. Cecil Carus-Wilson writes to *Nature* that he has invented a luminous crayon for the purpose of enabling lecturers to draw on the blackboard when the room is darkened for the use of the lantern. He hopes that the invention may prove of value not only to lecturers who use a lantern, but also (in another form) to those students who wish to take notes.

—In a long series of articles a native Japanese paper gives some interesting figures about the students of Tokio (republished in *Nature*). There are 107,312 students in the whole empire in the various colleges and other high schools (primary schools and ordinary middle schools excepted). Of this number, 38,114 represent students prosecuting their studies in the capital; that is to say, about 40 per cent of the whole number are congregated in

Tokio. Among the 38,114 students, 6,899 are domiciled in Tokio, so that the number of those coming from other localities is 31,215. The amounts which individual students spend vary from \$7 or \$8 to about \$15 per month. Taking the average, it may be assumed that each student spends \$10 a month, or \$120 a year. Thus the total amount of money annually disbursed by these lads is a little over \$3,700,000. In other words, money aggregating over three millions and a half is being yearly drawn from the provinces to the capital through this channel. The provinces receive little in return, for few of the students ever go back to their homes, their sole ambition being to remain in the capital, and there rise to eminence in some walk of life.

—Since the preparation of the article by Professor Angelo Heilprin in *Science* of Nov. 7, Mr. Israel C. Russell has made a preliminary report on his researches (in conjunction with Mr. Kerr) in the St. Elias region,—researches undertaken under the auspices of the National Geographic Society. The measurements of Kerr, as reported at length in some of the daily papers, give for the height of St. Elias *less than* 15,000 feet, which thus places Orizaba pre-eminently to the first place among North American mountains.

—At a meeting of the executive committee of the National Electric Light Association held at the Electric Club, New York City, Nov. 7, the date for holding the thirteenth convention was fixed for Feb. 17, 18, and 19, 1891. Eugene F. Phillips of Providence, where the convention will be held, was appointed chairman of a committee of five, on reception and arrangements, he to appoint the other members of the committee. Gen. C. H. Barney of New York was appointed chairman of a committee of three on electrical exhibits and transportation, he to appoint the other members of the committee. The committee on papers reported the following as promised, and stated that the prospects of securing two or three more important papers are most excellent (announcements of these will be made later): "How can the National Electric Light Association best serve Central Station Interests?" by C. R. Huntley, discussion by A. M. Young; "Distribution of Steam from a Central Station," by F. H. Prentiss, discussion by George H. Babcock; "Distribution and Care of Alternating Currents," by T. Carpenter Smith, discussion by G. H. Blaxter; "Municipal Control of Electric Railroads," by M. W. Mead, discussion by M. J. Francisco; "The Ferranti System," by C. B. Haskins, discussion by C. L. Edgar. The committee has not only secured the promise of these papers, but has gone a step further, and named a person to open the discussion on each paper. This must inevitably tend to bring out the best points of the topic, and to greatly add to the interest in and value of the proceedings.

—If we were to judge by statistics alone, says *Nature* of Oct. 16, we should be forced to conclude that the present system of granting rewards for the destruction of wild animals in India has had little or no effect in diminishing their numbers or in decreasing the mortality caused by them. This conclusion, however, would not be in accordance with facts. The methods according to which the statistics are collected have been so much improved, that no deduction can safely be made from the figures available. This is pointed out in a recent report of the Revenue Department of the Government of Madras. The report continues, "The experience of almost every district officer who has been some years in the country would be that the number of destructive wild animals had largely decreased with the advance of cultivation and the progress of railways, and the evidence of natives would probably be the same. There are parts of the country still, where, owing to the existence of forest and difficulty of access, wild animals of prey continue to exist in large numbers; and it is the case, that, owing to various causes, Europeans, at all events, do less now in the way of killing large game than formerly was the case. They have less time to spare from their official duties, and less money to spend. It can hardly, however, be doubted, that, owing to the existence of the system of granting rewards for animals slain, native shikaris are encouraged to maintain a profession which otherwise probably they would give up from want of support; and for this reason, if for no other, the board would not wish to see at present any change made in the system of granting re-

wards. It may be hoped that the construction of the East Coast Railway, and the branch from it through the heart of the Vizagapatam district to the Central Provinces, will tend in a great measure to reduce the number of wild animals in the districts where they now do very considerable damage. Cultivation and population in tracts now given up to jungle and grass will increase largely, and the need of wood for the railways will lead probably to the destruction of large areas of jungles, which now exist in tracts which should be devoted to agriculture."

—The Cornell University Experiment Station has made a series of experiments in setting milk for cream-raising by different methods, the results of which, as summarized in Bulletin No. 20 of that station, are as follows: in eleven trials where the milk was set in the Cooley creamer with ice-water at a temperature of 44°, the average per cent of fat in the skim milk was .23; in eleven trials where milk was diluted with an equal weight of cold water, and set in the open air, the average per cent of fat in the skim milk was 1.38; in six trials where milk was diluted with 20 and 50 per cent of cold water, the average per cent of fat in the skim milk was 1.24; in ten trials where milk was diluted with 10 to 100 per cent of its weight of hot water, the average per cent of fat in the skim milk was 1.11; in two trials where milk was set in deep cans without dilution, in running water at 60° to 63°, the average per cent of fat in the skim milk was .89; in two trials where milk was set in shallow cans, at 60° and 64°, the average per cent of fat in the skim milk was .48; in one trial where milk was set in shallow pans, and one-third of its weight of water at 120° added, the per cent of fat in the skim milk was .75.

—Plans, and estimates of time and cost of construction, will be received by Professor R. H. Thurston, director of Sibley College, Cornell University, not later than Dec. 25, 1890, for an experimental steam-engine, such as is customarily made a part of the equipment of technical schools of the higher class, and used by them in researches in steam-engineering. This institution already has a number of engines adapted in various ways for this work; but it is desired that one should be there installed which shall present peculiar facilities for illustration, and for investigations in connection with the higher graduate courses of instruction, and in the schools of steam-engineering, of marine engineering and naval architecture, now making preparation for their work, and in the school of railway mechanical engineering which it is anticipated may be organized should the former prove useful and successful. Plans, and estimates of cost of construction and of time required, will be received also from builders of testing-machines not later than Dec. 25, certain conditions being prescribed.

—The Harveian oration was delivered by Dr. Andrew on Saturday, Oct. 18, at the Royal College of Physicians. In the course of the oration, as we learn from *Nature*, Dr. Andrew referred to the fact that the relationship between physiology and medicine has in many ways greatly changed during the last two hundred and fifty years, and that such change is a necessary consequence of the progress made by physiology. "The goal of physiology is truth, e.g., perfectly trustworthy knowledge of a certain class of facts and laws; and this independently of any use, good or bad, to which that knowledge may be put. The goal of medicine is power; e.g., ability to manipulate certain given forces in such fashion as to produce certain effects. No doubt theoretically the two ends coincide, and we may hope in some remote future they will do so in reality and perfectly. For the present we must be content with having in one direction much knowledge which confers little or no power, and, on another side, very imperfect knowledge which yet brings with it very great power, too often ill directed. Again, their methods are different. Physiology by slow degrees has come to rely more and more on purely scientific modes and instruments of research, and to apply them by preference to matters which can be brought to the test of direct experiment. Medicine, on the other hand, has no choice but to remain, so far as it has a scientific side, a science of observation; for any thing like effective investigation of the matters with which it deals by direct experiment is impossible. As physiology slowly reduces to order the apparently hopeless confusion of so-called vital actions, the easiest questions are attacked and answered first, and thus

those which have to be faced later in their turn are more and more difficult, more and more refractory to scientific analysis. Now, these more difficult questions are often of vital importance to medicine, and in them lie dormant vast possibilities of increased knowledge of the nature of disease, of increased power over it. And yet, from the great difficulty of subjecting them to experiment, physiology may seem for a time to fail us, and the task of employing physiological results to explain clinical facts, or to form the basis of rational treatment, becomes harder than ever."

—In the great experiments of Sir John B. Lawes, which have been conducted on Rothamsted Farm for more than forty years, potash seems to have had no effect as a fertilizer for wheat, except when combined with both phosphoric acid and nitrogen. In the experiments now in progress at the Ohio Experiment Station, potash seems to have no effect on wheat, whether used alone or in any combination. At the experiment station of Kentucky (at Lexington), potash has produced a very marked increase of crop when used on corn, hemp, tobacco, and potatoes; but here, again, it fails to increase the yield of wheat, whether used alone or in combination, as indicated by experiments published in Bulletin No. 30 of that station, for August, 1890. The Ohio and Kentucky experiments are as yet in their infancy; and it is probable, that, as the soil becomes more worn, even wheat will show some benefit from applications of potash; but the present indications are that this substance is seldom needed in fertilizers intended for this crop. It may be that the clover following the wheat will make good use of the potash, but this point should be determined by experiment, not by guess-work.

—In the numerous experiments in feeding hogs conducted at the Agricultural Experiment Station of the University of Wisconsin, where corn-meal was the exclusive feed for a considerable length of time, it has been found that the bones of animals so fed are less strong in breaking-tests than the bones from hogs receiving other feeds. The question naturally arose as to the ability of Indian-corn to supply ash material for building up strong frames in animals to which it was fed. Successful feeders and observing farmers have long recommended the use of charcoal and hard-wood ashes for hogs, especially during periods when large amounts of corn were fed. Their experience with weak bones, and the ideas held by feeders, led the station to experiments in which hard-wood ashes were fed to some hogs receiving corn, and withheld from others. Knowing that meal made from the bones of animals, usually used for fertilizer, contains large amounts of phosphorus and lime, it was deemed proper to feed this at the same time that ashes were being fed, in order to ascertain if it was superior to ashes. In the sixth report of this station, two experiments in this line are given. Desiring to settle the question more definitely, the work was continued, and report made of two additional experiments, with the following results: 1st, that the effect of the bone-meal and ashes was to save about 130 pounds of corn, or 28 per cent of the total amount fed in producing 100 pounds of gain, live weight; 2d, that by feeding the bone-meal the strength of the thigh bones was doubled, and ashes nearly doubled the strength of the bones; 3d, that there was about 50 per cent more ash in the bones of the hogs receiving bone-meal and hard-wood ashes than in the others.

—The "Listener" had a most curious thing happen to him not many nights ago, as he states in the *Boston Transcript* of Nov. 3. He was asleep, and dreamed persistently of a gentleman of his acquaintance whose name is Hale. Nothing in the events or changes of his dream could get this Mr. Hale out of the foreground: he was always there; he did not transform himself into anybody else; he did not do any thing in particular nor say any thing in particular; he was simply Mr. Hale, and seemed to be there solely for the purpose of being Mr. Hale, and enforcing his constant, steady, vivid personality on the presence of the dreamer. This went on for some little dream-space, and then the dreamer awoke. It was in the middle of the night. His first conscious thought or perception was that it was raining very hard on the zinc roof of the porch. The rain seemed to beat down with immense violence. He rose to close a window, thinking that the water would beat in. As he advanced toward the window, the

storm ceased suddenly. "Why," said the "Listener" to himself, "that was like the sudden ceasing of a hail-storm." A queer thought about the dream came to him. He lighted a lamp, and looked out upon the roof of the porch, and there were many little heaps of fast-melting hail stones. Now, had the pelting of the hail upon the roof suggested that dream-presentation of the personality of Mr. Hale? Very likely it had. But by what process of consciousness? Evidently the dreaming consciousness or perception was superior to the waking consciousness; for, if the storm suggested the dream at all, the dreamer must have been aware that it was hail that was falling, in order that Mr. Hale should come forth; but, when he really woke from sleep into full consciousness, he took the storm for rain, and there was no thought of hail in his mind. It is a nut for the psychologists to crack, if they think it worth their while.

— During the month of August last, the Mediterranean fleet of the French Navy was supplied with a captive balloon for the purpose of reconnoitring. The balloon, according to *Engineering* of Oct. 24, was constructed at the military balloon works at Calais Meudon, and has a capacity of 11,300 cubic feet. It is inflated with hydrogen, which is carried in reservoirs under a pressure of 100 atmospheres. A tail-rope 130 feet long, which for lightness is best made of silk, serves to connect the balloon with a ship of the fleet. A number of ascents have been made with the balloon from the armor-clad "Formidable," the tail-rope being connected to the top of one of the military masts. Many officers of the vessel have made ascents, and are unanimous in their praise of the apparatus. On a clear day all important objects within a radius of eighteen to twenty-four miles can be clearly distinguished. Another important point is that the waters of the sea, when observed from a considerable altitude, are singularly clear, and the details of the bottom were in some of the ascents clearly distinguishable, even at depths of 80 feet. This peculiarity allowed an observer in the balloon to follow the movements of the submarine boat "Gymnote," during its recent trials, without losing sight of it for a single instant, whatever its depth of immersion. The balloons used are very stoutly constructed, and in September last one was towed at a speed of $10\frac{1}{2}$ knots per hour for a distance of 21 knots by the torpedo-boat "Audacieux" without suffering the slightest damage. It may be remarked, in conclusion, that Germany has also adopted balloons for naval purposes, and, during the recent manoeuvres at Wilhelmshaven, one of these was used from the war-ship "Mars" for reconnoitring.

— The first determination of the moon's mass was made by Newton in 1687, from the tides, and other investigators have since employed the same method, but for more than one hundred and eighty years it yielded no trustworthy result. Its failure was due to various causes, both theoretical and practical; and, although some of these were cleared up by La Place as early as 1818, there was little prospect of success until the recent application of harmonic analysis to the reduction of continuous observations of the tides, recorded by automatic gauges, and extending over long periods of time. Long ago Airy showed why the moon's mass cannot be accurately determined from the mere ratio of the solar and lunar effects in the semi mensural inequality of the tides; but nevertheless many of the values recorded have been obtained in that very way, and are therefore worthless. Those found by La-Place's method, or by Ferrel's modification of it, are theoretically correct, at least for deep-water tides; but, instead of confining himself to them, Professor William Harkness of the Naval Observatory, Washington, has computed many new values from the "Results of the Harmonic Analysis of Tidal Observations," which have been published by Major Baird and Professor Darwin. The final result of Professor Harkness's work is—

$$\text{Mass of Moon} = 0.012714 \pm 0.000222.$$

— A memorandum, together with a sample of the plant, lately received from Sir Alfred Moloney, the Governor of Lagos, says the *Journal of the Society of Arts* (London) of Oct. 24, gives an account of the endeavor he is making to encourage the exportation of the fibre known as "African bass,"—the fibre of the bamboo-palm (or *Raphia vinifera*). The bamboo-palm (*Raphia vinifera*) is perhaps the commonest tree in the swamps and lowlands which

line the waterways of the colony. Dense thickets of these palms, traversed only by the palm wine-gatherer or the bamboo-cutter, push their way into the lagoons, and extend over the flood grounds, and even to a distance of from fifteen to twenty miles up the river-valleys into the interior. The area occupied by these *Raphia* forests it would be impossible to calculate; but it may be accepted without doubt that they extend throughout the length of the colony, and to a distance of at least fifteen miles from the seacoast, and that over this area of about five thousand square miles they form a considerable proportion of the vegetation, next only in numbers to the oil-palm (*Elaeis guineensis*) and the mangrove (*Rhizophora mucronata*). The fibre itself is the one in most common employment on the coast, being used by the natives for all sorts of purposes,—cloth, cordage, thatch, fishing-lines, etc. The cost is only that of collection and preparation, the latter being a very simple process of soaking and scraping. The price, delivered in England, is said to be from \$150 to \$160 per ton for good fibre. The cost of production is estimated at \$70 per ton; shipping and other expenses, at \$22.50.

— Some time since, Mr. Albert Koebele, the California agent of the Division of Entomology of the United States Agricultural Department, was instructed to collect and forward to Mr. Wight in New Zealand a number of living specimens of a common *Raphidia* which he had found to destroy the larva and pupa of the codling-moth in California. This was done as a partial return for Mr. Wight's kindness to Mr. Koebele when he was in New Zealand in the spring of 1889, collecting the insect enemies of the fluted scale. Recent letters from Mr. Wight, and an article in the June number of the *New Zealand Farmer*, state that the shipment arrived in fairly good condition, although it was opened for examination, and held for ten days, at the custom-house. Twenty-one specimens were sent, each one in a small box with moss, and the whole enclosed in a strong wooden box. Mr. Wight found pupæ in sixteen of the boxes, and a larva in one; while three were empty, probably owing to the custom-house examination. The single larva was hungry and very attenuated, and it at once attacked and devoured a codling-moth larva twice its own size. It was so stretched out and distended that at first, not discovering the absence of the codling moth larva, Mr. Wight thought it was entering the pupa state; but it presently resumed its usual appearance, and finished several more larvæ. The result of this importation is looked forward to with great interest. The genus *Raphidia* is represented in this country only upon the Pacific coast, and it is not at all likely that it will flourish East. An attempt, however, will be made to introduce this ravenous creature into some of our Eastern apple-orchards.

— Next to the cabbage-worm, the worst insect enemy of the cabbage is the aphid, or plant-louse, which is so often found upon the leaves and in the heads in great numbers. This is a small, bluish-white insect, that subsists upon the sap of the plant, and multiplies with great rapidity. Like most of the peculiar family to which it belongs, this insect has the power, not common among insects, of bringing forth living young; but with most of those that have been carefully studied there is in the fall a sexual generation by which the true eggs are laid, and in this egg state most of them pass the winter. But although the cabbage aphid has been known both in Europe and America for more than a century, the sexual generation has never heretofore been found, and entomologists did not know where or when the eggs were laid, nor how the insect passed the winter. Recent investigations, however, carried on at the Ohio Experiment Station by Dr. C. M. Werd, have shown conclusively that the sexual generation develops late in autumn on the cabbage, and that the eggs are laid on the cabbage-leaves. The true male is a small winged creature, with a more slender body than the other winged forms. The egg-laying female has no wings, and is pale green in color. This discovery of the fact that the insect passes the winter in the egg state on the cabbage-leaves has an important economic bearing. It suggests, as one of the best ways of preventing the injuries of this pest, the destruction during winter of the old cabbage-leaves with the eggs upon them, instead of leaving them undisturbed until spring, as is too often done.